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ABSTRACT

A poster-newsletter, "Science Talk," was developed and its effectiveness at a major research university analyzed. The goal of the newsletter was to make information regarding upcoming research seminars sponsored by the science departments available campuswide and to raise the scientists' awareness level regarding the university's science education program. A readership questionnaire was attached to 150 copies of the newsletter and distributed to a stratified random sample consisting of heads of university science units, graduate students and professors in the sciences. The findings indicated that the section most frequently read first by all groups was the seminar schedule. All groups made use of the information the newsletter provided. Although all groups reported that they became more aware of research activity outside their own department, the effect on the professors was greatest. All groups demonstrated that their awareness of the science education program had increased. The consensus of each group was that good science teaching is not valued very highly at the university level. Other sets of information also used to evaluate the effectiveness of the newsletter included: anecdotal information from the groups concerning the usefulness; number of campus units asking for inclusion in the newsletter increased; and an increase in interdepartmental collaboration on university science instruction projects. This research shows that a poster-newletter can be very effective in sharing information vital to both scientists and science educators. (Author/CRW)

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An Analysis of the Effectiveness of an Interdisciplinary Poster-Newsletter in Improving Communication Between University Scientists and Science Educators

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Abstract

This research paper describes the development of a unique poster - newsletter called ***Science Talk*** and analyzes its effectiveness at a major research university. The newsletter was developed to make information regarding upcoming research seminars sponsored by the science departments available campuswide and to raise the scientists' awareness level regarding the university's science education program. The first section of this research paper provides the context of the analysis -- offering an overview that explains the development and distribution of the newsletter. The second part of the paper describes measures used to evaluate the effectiveness of the newsletter.

A readership questionnaire was attached to 150 copies of ***Science Talk***, and these were distributed to a stratified sample consisting of three groups. A follow-up questionnaire was distributed to the same sample. All the heads of university science units received a questionnaire as did a random sample of both graduate students and professors in the sciences. The forms were coded to allow identification of the respondent as an administrator, a professor, or a graduate student. The questions were framed using either a multiple - choice or a Likert scale (5 - point continuum), and space was provided both for comments on specific questions and for general comments. Questionnaire items dealt with personal preferences for various types of information included in ***Science Talk***, awareness levels regarding science education topics, and attitudes toward science teaching. Methods of analysis differed for each question, depending on the type of data collected.

The responses to each question were analyzed separately for each group -- administrators, professors, and graduate students. After intergroup differences between administrators, professors, and graduate students were found, the nature of the differences was explored. The section of ***Science Talk*** most frequently read first by all groups was the seminar schedule. All groups did make use of the information ***Science***

Talk provided. Although all groups reported that they became more aware of research activity outside of their own department, the effect on professors was greatest. In addition, all groups demonstrated that their awareness of the science education program had increased. The consensus of each group was that good science teaching is not valued very highly at the university level. Qualitative data were essential in analyzing this perception.

In addition to the questionnaire, several other sets of information were used for triangulation in evaluating effectiveness. The newsletter was seen to be conspicuously posted in the science buildings on campus during a hall-and-office survey. Anecdotal information concerning the usefulness of the newsletter was gathered from graduate students, professors, and several upper - level administrators including the chancellor of the university. The number of campus units that asked to be represented in ***Science Talk*** also increased, indicating a growing interest in this publication by the university's scientists. Another indicator of effectiveness was that several science education graduate students were offered assistantships by the science departments, and there was also an increase in interdepartmental collaboration on university science instruction projects.

This research documents that a poster - newsletter, such as ***Science Talk,*** can be very effective in sharing information vital to both scientists and science educators. The development of such a medium has improved awareness of science and science education research, strengthened constructive communication across disciplinary boundaries, and enhanced science instruction across the university campus.

An Analysis of the Effectiveness of an Interdisciplinary Poster-Newsletter in Improving Communication Between University Scientists and Science Educators

This research paper describes the development of a distinctive poster - newsletter and analyzes its effectiveness as a communication tool at a major research university. The first section of the paper provides the context of the analysis -- offering an overview that explains the development and distribution of the newsletter. The second part of the paper describes measures used to evaluate the effectiveness of the newsletter, including a readership survey conducted at the beginning of the fall semester, 1990.

Development of a Interdisciplinary Newsletter

Demonstrating the Need

Several discussions among faculty members and graduate students in science education at a major research university in the fall of 1989 revealed that very little information was available regarding upcoming presentations (by campus and outside speakers) constituting the research seminar series sponsored by the university's science departments. Further consultations with faculty members in the sciences revealed that, although most faculty members were familiar with the seminar schedule in their own department, they knew relatively little about the speakers, topics, or schedules of other departments.

There are many dimensions to this problem that are not unique to this university. First, scientists themselves bemoan the lack of communication between scientific disciplines (Baatz,1990; Wheeler,1989). Secondly, science education has much to offer the sciences, but without improved communication, its ability to contribute to

the improvement of instruction in the sciences at the university level is limited. Some scientific journals, such as the Journal of NIH Research (Hooper,1990) and the Bulletin of the Ecological Society of America (Feinsinger, 1987; Haemig, 1990; Klemow, 1990), have featured articles about science education research useful to scientists in their teaching. The Journal of College Science Teaching also provides an excellent example of constructive interchange between the various domains of scientific research and science teaching. However, there was no such shared medium in existence to disseminate this type of information or to offer such a forum on our campus.

Thirdly, this problem is not limited to universities; several authors have even called for better communication between university scientists and teachers at the elementary and secondary level. In addressing the upcoming shortage of scientists and engineers, Massey (1989) stated that the science educational system "has to be viewed as an integrated one from kindergarten through graduate school." Examples of proposed scientist-teacher interactions include Feinsinger's (1987) suggestions that university-level ecologists could contribute to science education by helping to develop educational materials and training volunteer workers. Haemig (1990) and Sigma XI (Harrison, 1990) emphasized that changes also need to be made in the college education of future science teachers. Specifically, Dittmer (1990) asserts that the university:

> can be a place for teachers to build a knowledge base, develop a research stance to examine issues that occur in the classroom, discipline their thinking through shared inquiry and discussion, and demonstrate the power of theory. (p. 82)

Massey (1989) suggested that the members of the American Association for the Advancement of Science and Sigma XI could ask their members to contribute some time to working with local schools in an appropriate way. The American Society of Zoologists published a symposium - based "Science as a Way of Knowing" series that is an extremely useful

reference for science teachers. Although all of these works called for constructive interaction between scientists and science educators, catalysis for this interaction was missing.

After searching for a practical solution, the second author came up with the idea of creating a large, poster-type newsletter that would include all the science seminar listings we could gather (from the various science-related departments) on one side of the poster. On the other side, short articles about science education, research related to science teaching, and science instruction news from the various science departments on campus would appear. This idea was put forward in a science education class attended by science educators, scientists, and graduate students in the sciences and education, and the idea was well - received there.

Production and Distribution

A proposal to an alumni organization on campus that funds special projects at the university was prepared. The suggested name for the newsletter was ***Science Talk*** -- a name with a double meaning to alert people to the science talks on campus and to get the scientists and science educators talking to each other. One thousand dollars in seed money was requested to cover start-up, production, and distribution costs for the pilot semester. The project was fully funded before the end of the fall semester in 1989, and the authors started at once to prepare ***Science Talk*** for the coming spring semester. The first issue of ***Science Talk*** appeared in early February of 1990 and the second in mid-March. Before the initial issue, hundreds of forms were distributed (with a cover letter) to science faculty members in the College of Basic Sciences, the museums, and the science research centers across campus in order to solicit information about their upcoming seminars. (For a detailed description of the development and production of ***Science Talk***, see Wandersee & Cummins, in press.)

About 3,000 copies of ***Science Talk*** were distributed per issue (see Figure 1). All of the faculty members and graduate students in the sciences at the university, as well as some faculty members on nearby college campuses, received ***Science Talk***. In addition, ***Science Talk*** was distributed to 1,300 science teachers throughout the state by including it in a state science fair mailing and by distributing it at the Louisiana Science Teachers' Association convention. Leaders in business and industry also received copies.

Method

Several methods were used to evaluate the effectiveness of ***Science Talk***. These included records of written and verbal feedback from the university scientists, administrators, and science educators, a hall - and - office survey (to determine whether or not the newsletter was actually being posted), and readership questionnaire data -- gathered during the fall semester of 1990. These methods represent a broad range of survey techniques, as described by Butts (1983).

The readership questionnaire was attached to 150 copies of ***Science Talk*** and was distributed with the newsletters to a stratified sample consisting of three groups. All the heads of the campus science units received a questionnaire, as did a random sample of both graduate students and professors in the sciences (see Table 1). The forms were coded by clipping corners to allow the researchers to ascertain whether a questionnaire had been returned by an administrator, a professor, or a graduate student. The last names of the persons in the sample were recorded to permit a follow-up survey to be distributed to the same sample. The follow-up survey was done in order to increase the response rate. Because previous researchers reported how difficult it was to persuade university professors to take part in surveys, the first questionnaire form we distributed had a packet of coffee attached to it as an incentive to return the questionnaire. The follow-up form had a

carefully worded paragraph about the importance of research and the importance of a high response rate.

Both questionnaire forms included these six questions:

1. How many issues of ***Science Talk*** have you seen?
2. Which part of the issue do you read first?
3. Has ***Science Talk*** moved you attend a seminar you would not otherwise have attended?
4. Has ***Science Talk*** made you more aware of research activity outside of your department related to your own research?
5. Has ***Science Talk*** raised your awareness of the Science Education program?
6. What is your perception of the relative importance of good science teaching at the university level?

The questions were posed in either multiple - choice or Likert scale (5 - point continuum) format, and space was provided for comments on specific questions and for general comments. The last question was purposely constructed to be open-ended and interpretable in a variety of ways in order to provoke qualifying comments from the readers.

The responses to each question were analyzed separately for administrators, professors, and graduate students and were also analyzed cumulatively. Methods of analysis differed for each question, depending on the data type. Multiple - choice questions were analyzed using frequency distributions. Means, standard deviations, and category response distributions were prepared for each Likert scale item (see Fraenkel & Wallen, 1990).

Qualitative data from the comments sections of the questionnaire were summarized (for each question) by each author. Qualitative data from the general comments section of the questionnaire were categorized and summarized according to whether they were related to the seminar schedule, the science education news, the science instruction news, or some other topic which appeared in ***Science Talk.***

A hall - and - office survey was conducted after the first issue of ***Science Talk*** for 1991 had been in distribution for about three weeks. Five of the science buildings on campus housing twelve departments and a variety of research institutes and centers were surveyed. These buildings contained the great majority of the departmental contributors to the seminar listings. The survey was conducted by walking through all of the unrestricted halls in each building and looking for the newsletter either posted in the hallway itself or posted visibly in offices, labs, or classrooms. During the survey, some graduate students and faculty in each building were interviewed informally to ascertain whether or not they were receiving ***Science Talk*** and whether or not they found the postable format useful.

Results

The response rate for the questionnaire varied between groups with the administrators having the highest rate (85 %). The professors had a response rate of 53 %, followed by the graduate students with a response rate of 25 % (see Table 1). In addition to the differences in response rates, intergroup differences in the responses themselves were found. The nature of these differences was analyzed separately for the administrators, professors, and graduate students.

By far, the majority of the respondents had seen more than one ***Science Talk*** (see Table 2), a fact which confirmed that their answers to the other questions could be considered informed responses. The section of ***Science Talk*** most often read first (by all groups) was the seminar schedule (see Table 3). As a group, professors were most likely to be moved to attend a seminar that they would not otherwise have attended. But the majority of all groups did make direct use of the information that ***Science Talk*** provided (see Table 4).

All groups became more aware of research activity outside of their own department . The professors showed the highest increase in their

awareness level (see Figures 2 and 3, and Table 5). Each group had its awareness of the university's science education program raised with the professors and chairs showing the highest increase (see Figures 4 and 5 and Table 5).

The final question asked the respondents to express their perception about the importance of good science teaching at the university level and was purposely vague to elicit comments. This elicitation strategy was successful, especially in the case of the professors and graduate students. The most common answer given by each group was a score of 5 (the highest possible -- considered good teaching important) (see Figure 6 and Table 5), which was 48 percent of the total cumulative response (see Figure 7). However, analysis of the qualitative data for this question gave additional insight into this result. When the comments by the respondents answering with a "5" were analyzed, this result is not as clear - cut as it first seems. In many cases, these respondents had obviously expressed their personal perception that good teaching was important. This personal perception was contrasted with what they believed to be a much more prevalent perception that teaching was not valued nearly as much by the university administration as research and/or grant - writing activity. They felt any tangible rewards given for good teaching by the university were merely tokenism and were disproportionate to the effort required. The following typical, verbatim quotations taken from the "comments" section of the survey illustrate these concerns (**C** = Chairs, **P** = Professors, **G** = Graduate Students):

> As far as I can tell, there are no awards or rewards for good teaching. The system condones poor teaching. **(C)**
>
> No perception [about the importance of good teaching at the university]. **(C)**
>
> The resources at [the university] are too limited to fully support excellence in teaching (e.g., poorly designed classrooms, poorly

maintained classrooms, mediocre to poor equipment, poor rewards for good teaching poor faculty / student ratio, etc, etc. **(C)**

Unfortunately, teaching is not considered important for promotion in the sciences at [the university]. **(P)**

Just lots of lipservice about good teaching. **(P)**

I teach [course omitted for anonymity] and I have no teaching assistant for 500 students. I get grief if I Xerox® even one page. My promotions depend on research. **(P)**

Just don't be a bad teacher! No one cares if you are a good teacher. **(P)**

Good teaching receives "lip service" but small recognition. Good teaching rarely comes naturally. It must be encouraged. ***Science Talk*** keeps science education visible. **(P)**

In my opinion good teaching is important. I do not believe this is the general opinion of faculty (I'm a grad. student). **(G)**

Good science teaching is not stressed nearly as much as it should be -- probably because the university gets money and recognition for research -- not for quality teaching. **(G)**

Good teaching considered important, but not necessarily acted on. **(G)**

I've always felt that the purpose of a university is to education, but as in most schools, research is a bigger priority. Students deserve better than that. **(G)**

There seemed to be conflicting opinions about just who in the university did not consider teaching to be important. Most respondents seem to feel those above them who were making tenure and promotion decisions did not value teaching, but this was not a universal perception. The following quotes are representative of respondents who held the opinion that their peers, not the university's administrators, valued teaching less highly than research:

> [Respondent rated value of teaching with highest score] This is my perception. It is also my perception that a significant number of my colleagues prioritize teaching considerably below research and are disturbed that higher levels of administration are showing so much interest in instructional improvement at the possible expense of additional research support. **(P)**
>
> Depends on audience -- higher administration sees it as very important -- 5; many of my colleagues see it a relatively unimportant (compared to research) -- 2-3. **(P)**

These perceptions may be related to the public statements of the new chancellor of the university, who has often spoken of improving classroom instruction.

When the ranking of "5" is discounted for those respondents who gave a comment contrasting personal perception with what they felt was a more common perception, the percentage of respondents choosing "5" drops to only 35 %, with a corresponding shift of 13 % of the responses to a lower (good teaching not considered important) category. It should be noted that this is a rather conservative estimate, in that some of the respondents may not have made similar comments even though they felt the same way.

The "general comments" section yielded some supportive data. This section was usually used by respondents to give an overall reaction to ***Science Talk***. The following comments are illustrative of those made by the majority of the readership:

> Great work with ***Science Talk*** -- please keep it going. **(C)**
>
> Keep up the good work. **(3C)**, **(P)**,
>
> It is a good idea that appears to be working well. **(C)**
>
> Very worthwhile project. **(C)**
>
> Thank you for you[r] efforts! **(2P)**

> The seminar schedule is great! **(P)**
>
> I attribute the number of new faces at our weekly seminar to broader advertisement through ***Science Talk.*** **(P)**
>
> There still seems to be a polarization between "educators" and "scientists." As a member of the latter group -- I'd like to be more in the middle career-wise, etc.... **(G)**
>
> ***Science Talk*** is very much needed and appreciated.... **(G)**
>
> ***Science Talk*** is a great service -- Keep it up! **(G)**
>
> I really found ***Science Talk*** to be very informative. I really feel that ***Science Talk*** can only help to increase awareness and perhaps more importantly, to motivate us all to achieve higher academic standards.... **(G)**

Of course, not all comments were positive:

> Too much material arrives in the mail and time is not available to do it justice. Consequently reading depends on the pile of mail per day. **(C)**
>
> Often receive "***Science Talk***" after many of seminars have already been given. **(P)**
>
> I would like to see more articles dealing with current research being conducted in all the science dept's. here at [the university], as well as a list of recent publications by all the individual depts. **(G)**

It should be noted that we do list all seminars that occurred between publication dates, with a notation that we are doing this for the readers' information. This means that some seminars will have already occurred by the publication date. In many cases, this is a function of short lead time due to departmental scheduling delays.

In addition to the questionnaire, several other sets of information were used as multiple gauges of effectiveness. First, verbal and written

comments (all favorable) concerning the usefulness of the newsletter were received from graduate students, professors, and several upper - level administrators, including the chancellor of the university, and were recorded. Supportive letters from people across the state who were not on the original mailing list were also received with requests that they be included for the second issue.

Secondly, the number of campus units that asked to be represented in the next ***Science Talk*** increased from 11 to 14 after the first issue appeared, indicating increasing interest in this service by the university's scientists. It should also be noted that the highest number of seminars listed (71) was in the fourth issue.

Thirdly, the newsletter was observed to be posted conspicuously in the science buildings on campus during a hall - and - office survey. The number posted varied between buildings and between floors. It should be noted that some floors had only rough tile walls and no bulletin boards or had walls lined with equipment. Therefore, some areas included in the survey had nothing posted in the hallways. The Life Sciences Building had the most ***Science Talk*** postings, with 12 copies easily visible. Most departments had at least one posted ***Science Talk*** clearly visible, and many more could have been posted in offices, labs, or classrooms that were not accessible to the surveyor. One ***Science Talk*** schedule with particular high visibility was posted in the Chemistry Library, which is used as a research and study area for many science undergraduate and graduate students. ***Science Talk*** was also posted in the undergraduate entry level zoology labs, which would expose future teachers and scientists to the research activity on campus at an early stage in their careers. As anticipated, all of the ***Science Talks*** seen, except for one, had the seminar schedule facing outward. The informal interviews with graduate students and faculty conducted during the hall - and - office survey showed that the distribution system of ***Science Talk*** was indeed successful in getting the newsletter into the hands of the

readership. The great majority of those questioned did recommend retaining the postable format and did notice the newsletter being posted in the building.

One of the most encouraging outcomes of the project occurred when several people outside the science education unit contacted the ***Science Talk*** staff (after the first issue was distributed) to provide information about innovative teaching projects on campus. This information was shared with the scientific community in articles in the next issues of ***Science Talk***.

Such new contacts in many campus units showed that in almost every science group on campus, there are one or two individuals who care passionately about teaching. ***Science Talk*** has served as a bridge between science educators and these people, and made them aware of their counterparts in other departments. This has already resulted in the placement of several science education graduate students in assistantships offered by the university's science departments and in an increase in cooperation on science instruction projects.

Discussion, Summary, and Significance

Our results show that a poster - newsletter such as ***Science Talk*** can be very effective in sharing information vital to both scientists and science educators. The information disseminated can improve awareness of both science and science education research, enhance constructive communication, improve science instruction across campus, serve as a recruitment tool for the science education program, and lead to innovative collaboration and the creative development of grant proposals. The university (especially the one in this study, which is classified as a Research I University by the Carnegie Foundation for the Advancement of Teaching) should provide a contemporary Baconian "marketplace of ideas" and a forum for outstanding researchers. Since science is becoming increasingly interdisciplinary, it seems both

unproductive and tragic that researchers studying related topics in different departments are unaware of seminars relevant to their work.

This lack of communication is not rare on other campuses across the country. As Baatz (1990) observes, "Science in the modern world is conspicuous, not only for its ubiquity and size but also for its fragmentation into increasingly esoteric specialties" (p. 248). In contrast to practice, Tourtellotte (1989) maintains that the increasing unity of the sciences is something that needs to be stressed in teaching students about science.

The results from our readership questionnaire show that the effectiveness of the newsletter varies, depending upon the academic position of the reader. However, the low response rate of the graduate students may make the results from that group less generalizable. We know that graduate students feel intense pressure from professors not to take any time away from their research and this may be one reason for their low response rate. We can also speculate that because graduate students constitute a relatively transient population, they may not consider themselves a permanent part of the university community.

What might the significance of this research be? The results of this investigation suggest that research universities may benefit from the production, publication, and distribution of an interdisciplinary poster - newsletter, which contains a campuswide science / science education seminar schedule and science education news. Triangulation of data from a readership questionnaire, a hall - and - office survey, and anecdotal records supports this conclusion. In view of the limited contact that university scientists typically have with science educators, such a tested communication tool seems both desirable and necessary.

While other university - sponsored, science - related newsletters do exist (see Table 6), most are departmental or programmatic. While university - sponsored newsletters related to science occur nationwide, they are least common in the southern United States, and our newsletter seems to be the only one published by an education department in the

South. We were unable to locate any designed to link the university sciences to science education. This study suggests that a newsletter such as this may be beneficial on any large campus, and our colleagues at other universities are encouraged to consider a similar pilot program, modifying the basic concept to fit their academic situation. We believe that only when scientists and science educators work together will university science teaching improve, and only then will the university's science education program become an integral part of the scientific community on campus.

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Table 1

Survey Return Rate by Group

	Possible	1st Round	2nd Round	Total Return	Percent Returned
Chairs	20	7	10	17	85 %
Professors	45	14	10	24	53 %
Graduate Students	85	13	8	21	25 %
Totals	150	34	28	62	41 %

Table 2.

Number of Issues of ***Science Talk*** Seen by Each Group.

# of Issues Seen	Chairs	Professors	Graduate Students
1	6 %	0 %	14 %
2	35 %	8 %	38 %
3	24 %	58 %	33 %
4	35 %	21 %	14 %
No response	0 %	13 %	0 %

Table 3.

Section of ***Science Talk*** Read First

Section	Chairs	Professors	Graduate Students
Seminar Schedule	47 %	75 %	71 %
Science Instruction	24 %	8 %	10 %
Science Education	12 %	13 %	10 %
No Response	18 %	4 %	10 %

Table 4.

Proportion of Sample Attending at Least One Seminar Because of ***Science Talk***

	Chairs	Professors	Graduate Students
Did Attend	59 %	63 %	52 %
Did Not Attend	41 %	33 %	43 %
No Response	0	4 %	5 %

Table 5.

Means and Standard Deviations for Likert Scale Items

	Research Activity		Awareness of Science Education		Importance of Science Teaching	
Group	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Chairs	3.18	1.38	3.56	1.23	4.31	1.01
Professors	3.22	0.95	3.57	1.27	3.22	1.57
Graduate Students	3.05	1.18	3.20	1.01	4.20	1.24
Cumulative	3.15	1.14	3.45	1.17	3.85	1.40

Note. Data collected on a Likert scale with a 5 - point continuum.

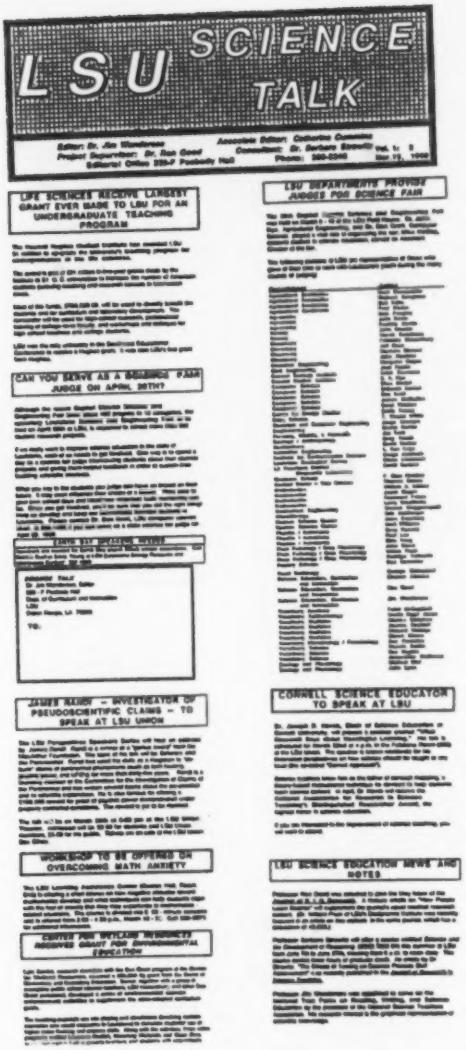
Table 6.

Information Regarding Other Science - Related Newsletters

	Percent of All Science - Related Newsletters (N = 238)
University Affiliated	**16 %**
Produced by Science Departments	**13 %**
Produced by Education Departments	**.4 %**

Note. Data taken from a national newsletter database compiled by the Institute for Chemical Education, Department of Chemistry, University of Wisconsin at Madison.

Figure 1.



LSU SCIENCE TALK

LIFE SCIENCES RECEIVE LARGEST GRANT EVER MADE TO LSU FOR AN UNDERGRADUATE TEACHING PROGRAM

CAN YOU SERVE AS A SCIENCE FAIR JUDGE ON APRIL 26TH?

JAMES RANDI -- INVESTIGATOR OF PSEUDOSCIENTIFIC CLAIMS -- TO SPEAK AT LSU UNION

WORKSHOP TO BE OFFERED ON OVERCOMING MATH ANXIETY

CENTER FOR INTEGRATE STUDIES RECEIVES GRANT FOR Environmental EDUCATION

LSU DEPARTMENTS PROVIDE JUDGES FOR SCIENCE FAIR

CORNELL SCIENCE EDUCATOR TO SPEAK AT LSU

LSU SCIENCE EDUCATION NEWS AND NOTES

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Figure 2.

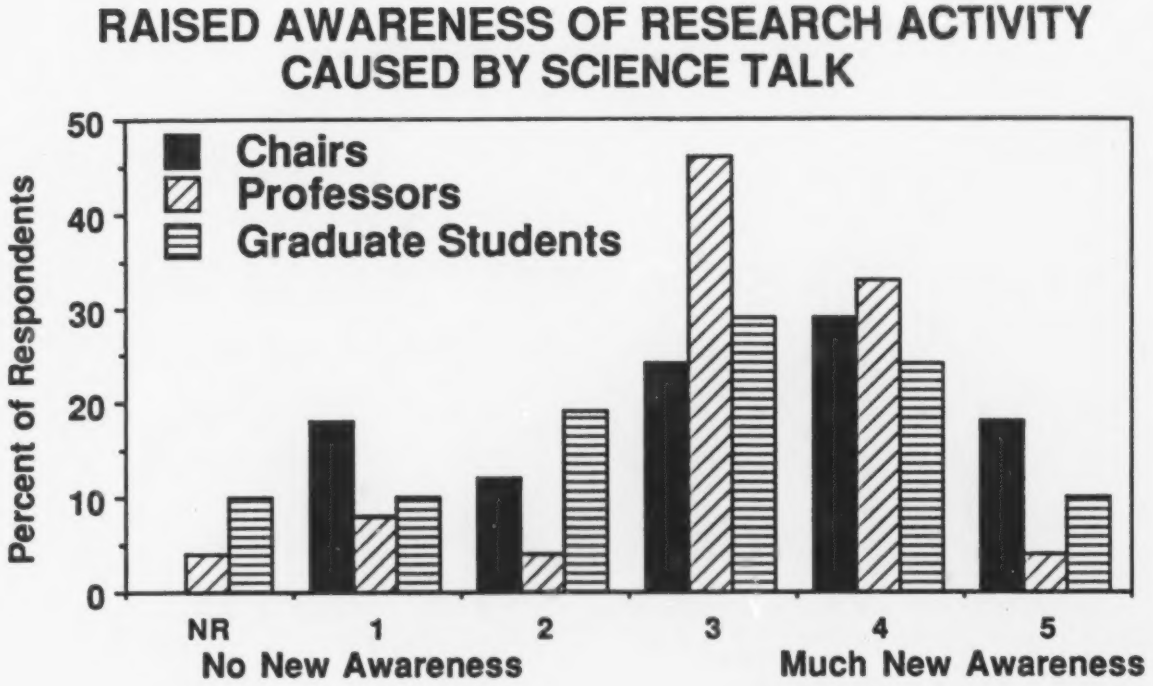
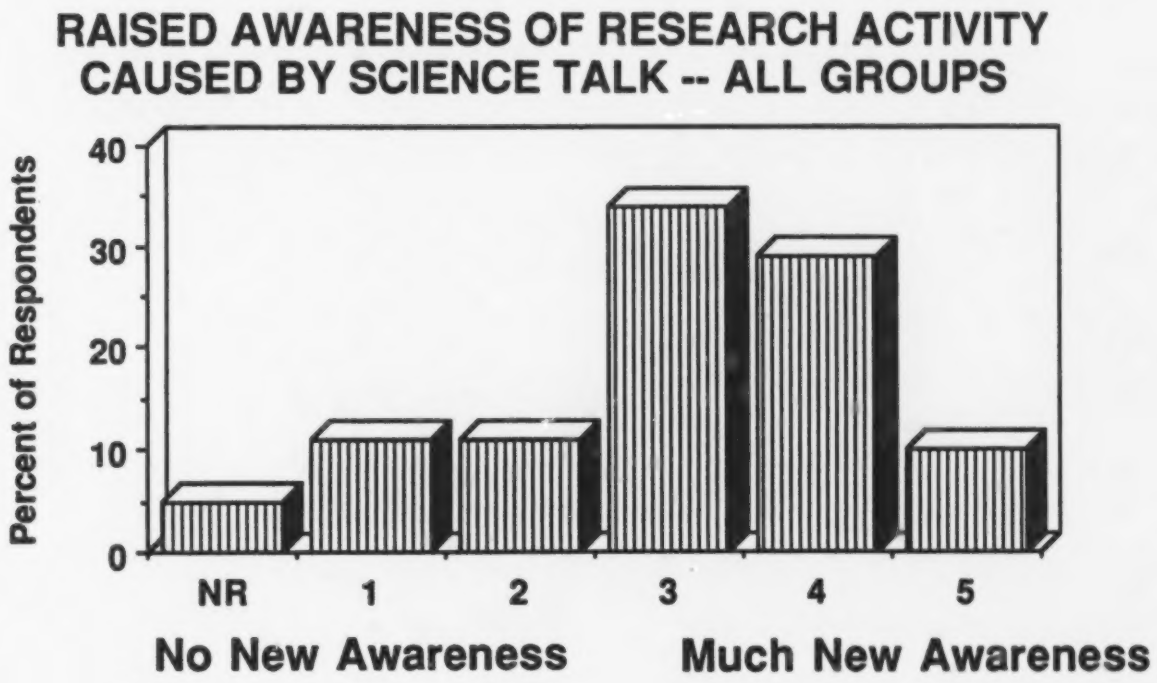


Figure 3.



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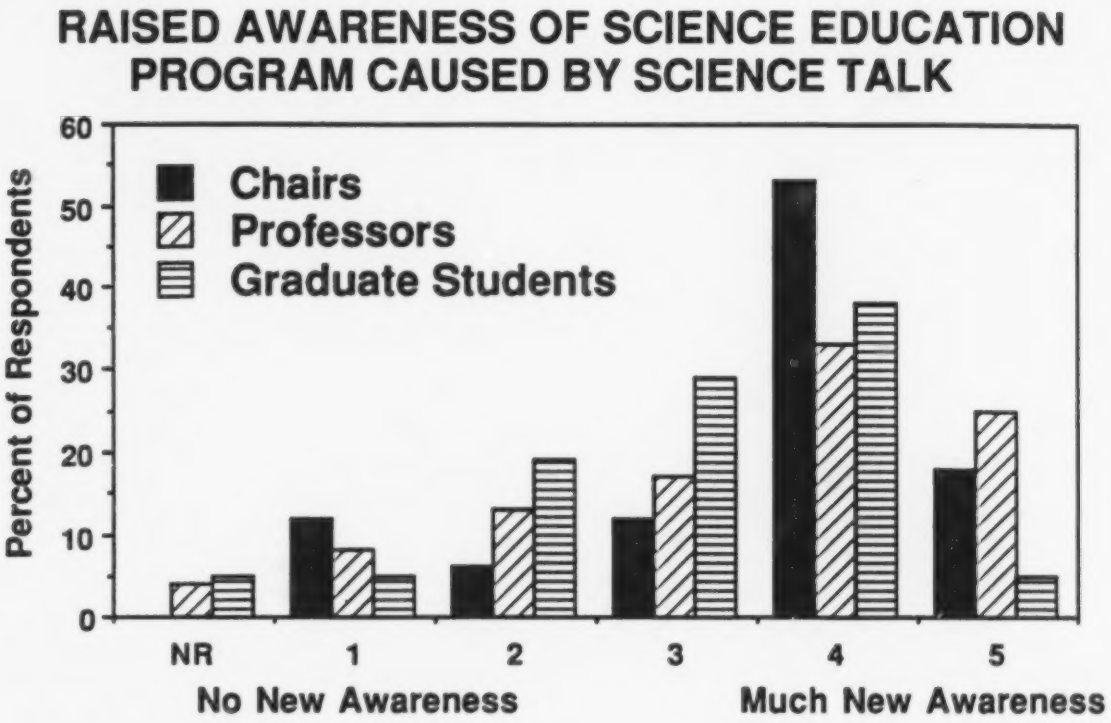

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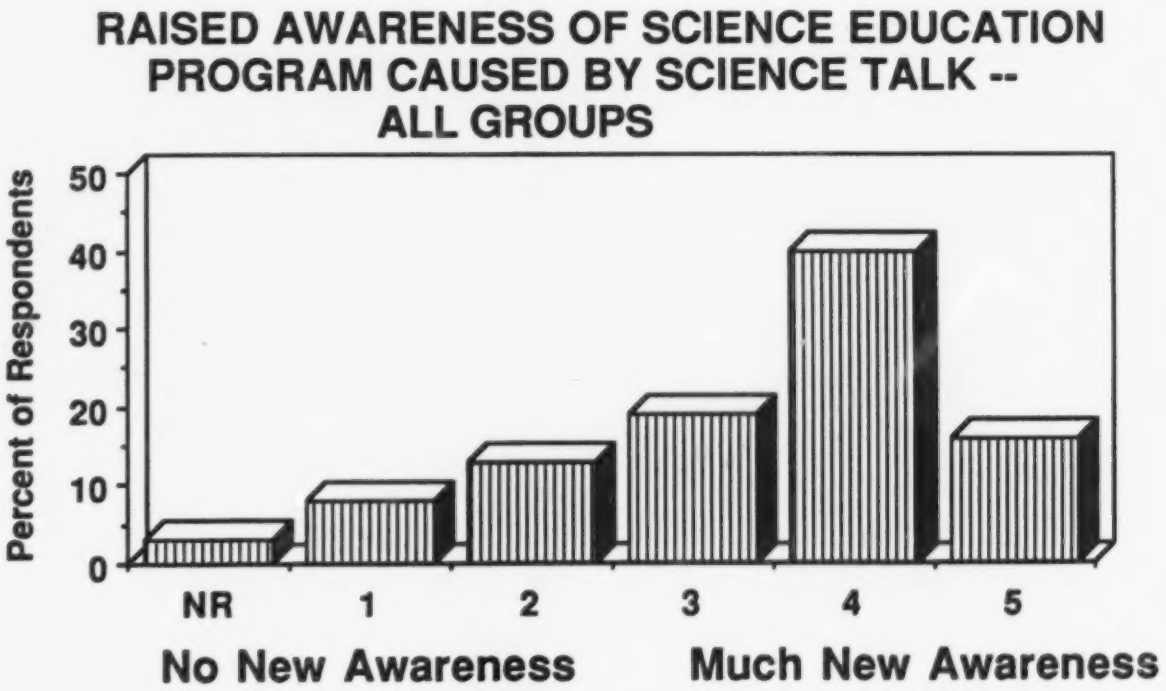

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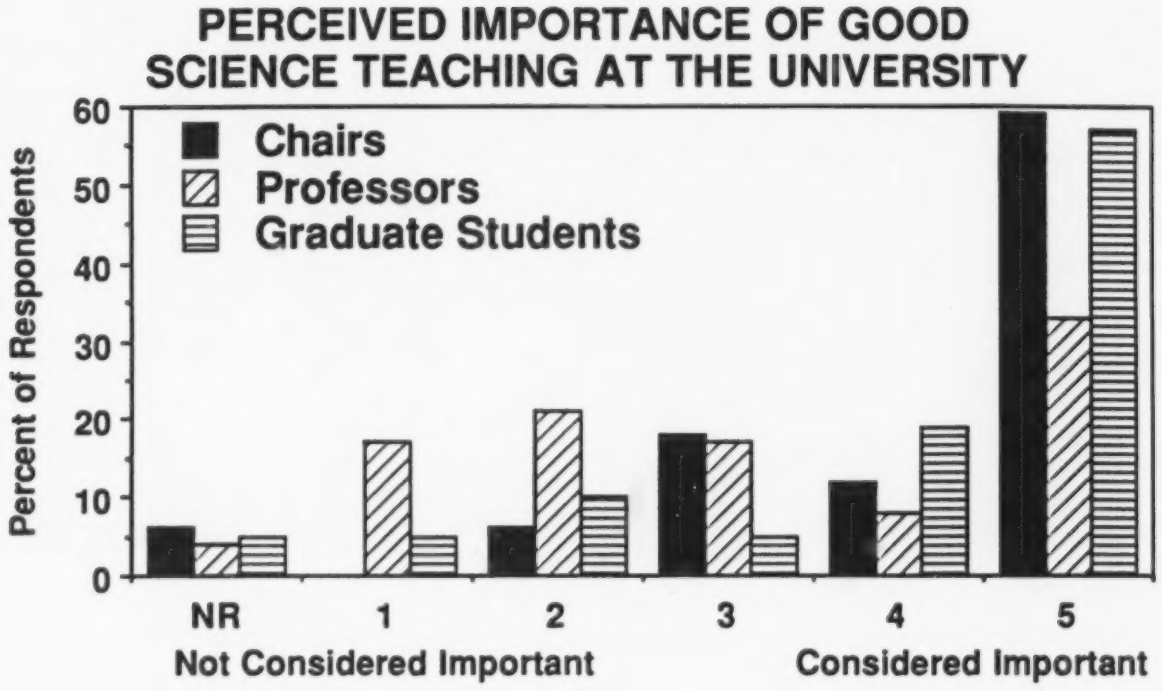

Figure 7.